546C-46 (1) FEM 1.209:510083/990

MAR 30 1990

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FLOOD INSURANCE STUDY

(28)

TOWN OF WEST POINT, VIRGINIA

KING WILLIAM COUNTY

(6) JUNE 18, 1990

(5) Federal Emergency Management Agency

(4) COMMUNITY NUMBER - 510083

NOTICE TO
FLOOD INSURANCE STUDY USERS

Communities participating in the National Flood Insurance Program (NFIP) have established repositories of flood hazard data for floodplain management and flood insurance purposes. This Flood Insurance Study (FIS) may not contain all data available within the repository. It is advisable to contact the community repository for any additional data.

Part or all of this FIS may be revised and republished at any time. In addition, part of this FIS may be revised by the Letter of Map Revision (LOMR) process, which does not involve republication or redistribution of the FIS. It is, therefore, the responsibility of the user to consult with community officials and to check the community repository to obtain the most current FIS components.

Initial Flood Insurance Study Effective Date: June 18, 1990

Flood Insurance Study Revised:

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FLOOD INSURANCE STUDY
TOWN OF WEST POINT, KING WILLIAM COUNTY, VIRGINIA

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study investigates the existence and severity of flood hazards in the Town of West Point, King William County, Virginia, and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study has developed flood risk data for various areas of the community that will be used to establish actuarial flood insurance rates and assist the community in its efforts to promote sound floodplain management. Minimum floodplain management requirements for participation in the National Flood Insurance Program (NFIP) are set forth in the Code of Federal Regulations at 44 CFR, 60.3.

In some states or communities, floodplain management criteria or regulations may exist that are more restrictive or comprehensive than the minimum Federal requirements. In such cases, the more restrictive criteria take precedence and the state (or other jurisdictional agency) will be able to explain them.

1.2 Authority and Acknowledgments

The sources of authority for this Flood Insurance Study are the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

The hydrologic and hydraulic analyses for this study were prepared by the Norfolk District of the U. S. Army Corps of Engineers (COE) for the Federal Emergency Management Agency (FEMA), under Inter-Agency Agreement No. EMW-87-E-2509, Project Order No. 3, Amendment No. 1. This work was completed in July 1988.

1.3 Coordination

On June 17, 1986, an initial Consultation and Coordination Officer's (CCO) meeting was held with representatives of FEMA, the town, and the COE (the study contractor) to determine the flooding sources to be studied by detailed methods. During the preparation of this study, contacts were made with various state and Federal agencies in order to minimize possible hydrologic and hydraulic conflicts. A search for basic data was made at all levels of government.

On July 12, 1989, a final CCO meeting was held with representatives of FEMA, the town, and the study contractor to review the results of the study.

2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the incorporated area of the Town of West Point, King William County, Virginia. The area of study is shown on the Vicinity Map (Figure 1).

Tidal flooding from the York, Pamunkey, and Mattaponi Rivers and their adjoining estuaries was studied by detailed methods. The areas studied by detailed methods were selected with priority given to all known flood hazard areas and areas of projected development and proposed construction through July 1993.

2.2 Community Description

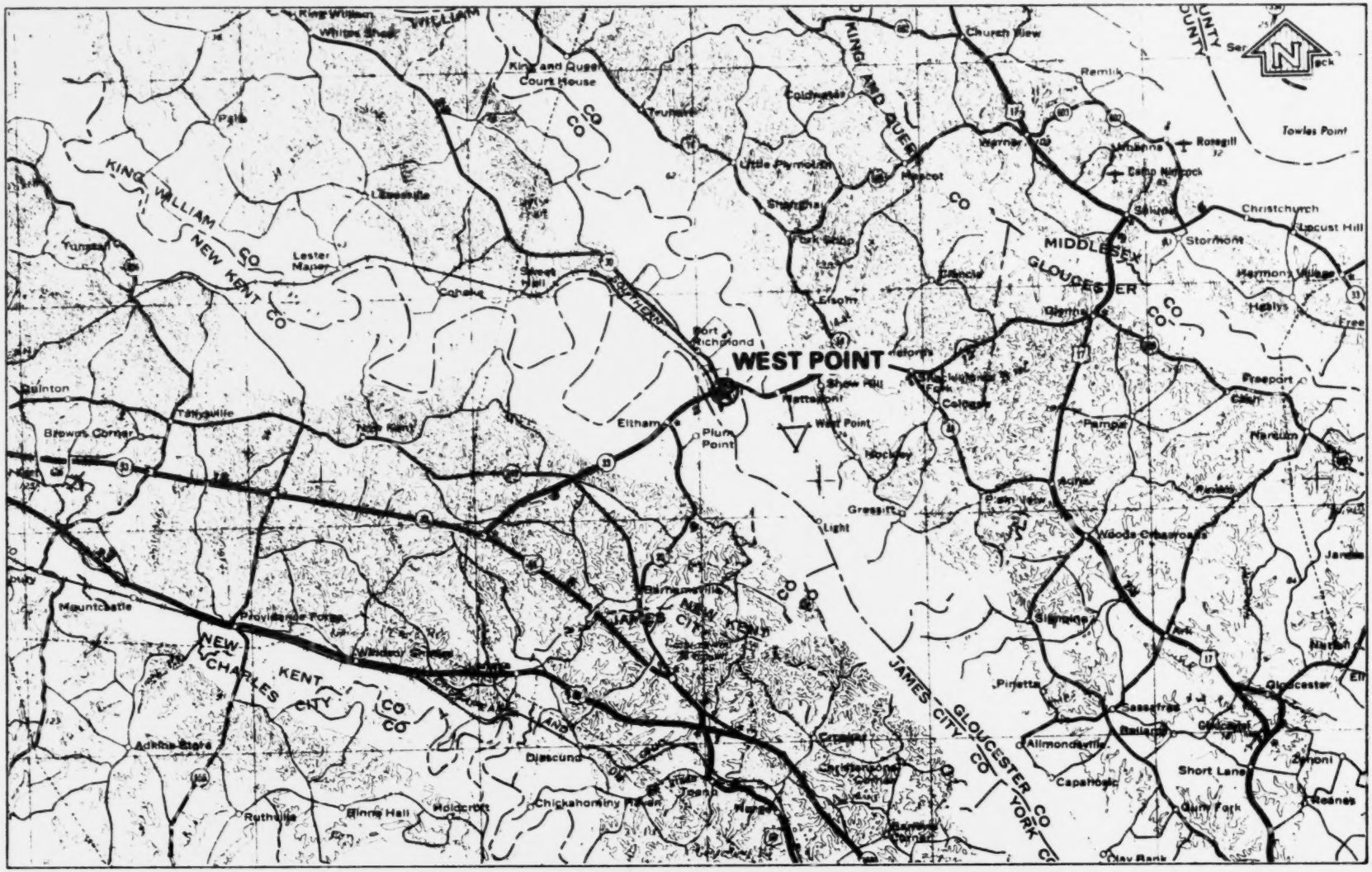
The Town of West Point is located in King William County, in the north-central tidewater portion of Virginia, an area sometimes referred to as Middle Neck. The town is bordered by the unincorporated areas of King and Queen County to the north and east, the unincorporated areas of King William County to the northwest, the unincorporated areas of New Kent County to the west, and the York River to the south. The town encompasses approximately 4.8 square miles of land area and had a 1980 population of 2,726 (Reference 1). The incorporated Town of West Point was created by act of the General Assembly in 1870 (Reference 2).

Development in the floodplains of the town consists of residences and businesses. Increased pressure for development of the floodplains can be anticipated with future development of the area.

Abundant forests and three navigable rivers were the natural resources that brought early industries to the Town of West Point. The rivers provided transportation and nourished the seafood industry. The Chesapeake Corporation of Virginia is the primary employer for residents of the town.

The area enjoys a temperate climate, with moderate seasonal changes, characterized by warm summers and cool winters. Temperatures average approximately 78 degrees Fahrenheit (^{o}F) during July, the warmest month, and 41^{o}F in January, the coolest month. Annual precipitation over the area averages approximately 43 inches per year (Reference 3). There is some variation in the monthly averages; however, rainfall is distributed uniformly throughout the year. Snowfall is infrequent, generally occurring in light amounts and usually melting within a short period of time.

The Town of West Point lies in the Coastal Plain province, an area underlain predominantly by sand, gravel, clay, shell, and marl strata. Elevations within the town range from sea level to approximately 30 feet.


WEST POINT
KING WILLIAM CO
NEW KENT CO
KING AND QUEEN CO
MIDDLESEX CO
GLOUCESTER CO
JAMES CITY CO
YORK CO
CHARLES CITY CO
NEW KENT CO
Fort Richmond
Plum Point
Towles Point
Church View
Remlik
Warner
Mattaponi
Aylett
Sweet Hall
Lester Manor
Dunkirk
Dalton
Tallyville
Brown's Corner
Mountcastle
Providence Forge
Adkins Store
Ruthville
Elmira Hall
Holdcroft
Chickahominy Haven
Diascund
Barhamsville
Lanexa
Norge
Toano
Croaker
Grapevine Corner
Light
Gressitt
Hockley
Eltham
Colosse
Pampa
Stormont
Christchurch
Locust Hill
Healys
Freeport
Narrow
Woods Cheswood
Signpine
Pinetta
Allmondsville
Capahosic
Short Lane
Gray Park
Reanes
Gloucester
Sassafras
Ordinary
Bailey
Zanoni
Clay Bank
Glenns
Saluda
Rosegill
Deep Neck
Whiting
Whites Shop
King and Queen Court House
Little Plymouth
Shacklefords
Oak Shop
Ebenezer
Walkerton
Melrose
Pleasant Hill
Acton
Plain View
Parkers
Ware Neck
Ware Church
Todds Point
Cooks Corner
Mount Olivet
Mount Zion
Providence
Windsor Shades
Lanexa
Barhamsville
Diascund
Croaker
Toano
Norge
Grapevine Corner
Chickahominy Haven
Holdcroft
Ruthville
Elmira Hall
Adkins Store
Mountcastle
Providence Forge
Dalton
Tallyville
Brown's Corner
Lester Manor
Dunkirk
Sweet Hall
Aylett
Mattaponi
Eltham
Plum Point
West Point
Hockley
Gressitt
Light
Pampa
Acton
Plain View
Parkers
Ware Neck

2.3 Principal Flood Problems

The areas along the shoreline of the Town of West Point are vulnerable to tidal flooding from major storms, commonly referred to as hurricanes and northeasters. Both storms produce winds that push large volumes of water against the shore.

Hurricanes, with their high winds and heavy rainfall, are the most severe storms to which the town is subjected. The term "hurricane" is applied to an intense cyclonic storm originating in tropical or subtropical latitudes in the Atlantic Ocean just north of the equator. While hurricanes may affect the area from May through November, nearly 80 percent occur during the months of August, September, and October with approximately 40 percent occurring during September. The most severe hurricane to strike the town occurred in August 1933.

Another type of storm that can cause severe damage to the town is the northeaster. This is also a cyclonic storm, and originates with little or no warning along the middle and northern Atlantic Coast. These storms occur most frequently in the winter months but may occur at any time. Accompanying winds are not of hurricane force, but are persistent, causing above-normal tides for long periods of time. The March 1962 northeaster was the most severe to ever hit the town.

The amount and extent of damage caused by any tidal flood will depend upon the topography of the area flooded, rate of rise in floodwaters, depth and duration of flooding, exposure to wave action, and the extent to which damageable property has been placed in the floodplain. The depth of flooding during these storms depends upon the velocity, direction, and duration of the wind; the size and depth of the body of water over which the wind is acting; and the astronomical tide. The duration of flooding depends upon the duration of the tide-producing forces. Floods caused by a hurricane are usually of a much shorter duration than the ones caused by a northeaster. Flooding from hurricanes rarely lasts more than one tidal cycle; however, flooding caused by northeasters may last several days, during which the most severe flooding takes place at the time of the peak astronomical tide.

The timing or coincidence of the maximum storm surge with the normal high tide is an important factor in the consideration of flooding from tidal sources. The mean range of tide in the York River at West Point is 2.8 feet. The range of tide may be somewhat less in the connecting creeks and inlets (Reference 4).

The Town of West Point has experienced major storms since the early settlement of the area. Historical accounts of severe storms in the area date back several hundred years. The following paragraphs discuss some of the large storms that have occurred in recent history.

The hurricane of August 23, 1933 was one of the most severe storms that ever occurred in the Middle Atlantic region. This tropical hurricane passed inland near Cape Hatteras on August 22, passed slightly west of Norfolk, and continued towards the north accompanied by extreme high wind and tide. The storm surge in the bay and tidal estuaries was the highest of record and coincided with astronomical high tide. The water level reached a maximum of 8 feet in Hampton Roads (Reference 5).

Hurricane "Hazel," the second most destructive of recent hurricanes to strike the area, entered the mainland south of Wilmington, North Carolina, during the morning of October 15, 1954, and moved rapidly northward passing over Norfolk and Fredericksburg in the early afternoon. The winds were from the east and southeast until the eye passed. When the eye passed, the winds shifted to the southwest with higher velocities. The hurricane surge was not as high as the August 1933 storm, although the tidal surge was superimposed on the normal high tide. In addition to damage by tidal flooding, much damage was caused to roofs, communication lines, and other structures by the high wind. Damage of this nature is characteristic of that to be expected during hurricanes (Reference 5).

The most recent flood of major proportions in the area occurred during the northeaster of March 6-8, 1962. Disastrous flooding and high waves occurred along the Atlantic seaboard from New York to Florida. This flood was unusual, even for a northeaster, since it was caused by a low pressure cell that moved from south to north past Hampton Roads and then reversed its course, moving again to the south and bringing with it huge volumes of water and high waves. The maximum flood height occurred on the morning of March 7 and reached 7.4 feet in Hampton Roads (Reference 6).

2.4 Flood Protection Measures

There are no existing flood control structures that would provide protection during major floods in the Town of West Point. There are several measures that have provided some protection against flooding. These include bulkheads, seawalls, jetties, and nonstructural measures for floodplain management, such as zoning codes. The "Uniform Statewide Building Code," which went into effect in September 1973, states, "where a structure is located in a 100-year flood plain, the lowest floor of all future construction or substantial improvement to an existing structure...must be built at or above that level, except for nonresidential structures which may be floodproofed to that level" (Reference 7).

3.0 ENGINEERING METHODS

For the flooding sources studied in detail in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude which

are expected to be equaled or exceeded once on the average during any 10-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for floodplain management and for flood insurance rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10, 2, 1, and 0.2 percent chance, respectively, of being equaled or exceeded during any year. Although the recurrence interval represents the long term average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than 1 year are considered. For example, the risk of having a flood which equals or exceeds the 100-year flood (1 percent chance of annual exceedence) in any 50-year period is approximately 40 percent (4 in 10), and, for any 90-year period, the risk increases to approximately 60 percent (6 in 10). The analyses reported herein reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Hydrologic Analyses

Analyses were carried out to establish the peak elevation-frequency relationships for each flooding source studied in detail affecting the community.

Tidal records for the Town of West Point are limited, and used alone, are inadequate to establish a tide-frequency relationship. However, mean tide levels at several locations in King William County and limited high-water data at West Point were correlated with mean tide levels and tide frequency curves developed for both the Norfolk Harbor gage and the Gloucester Point gage. The Norfolk Harbor gage is located approximately 10 miles inside Chesapeake Bay in Portsmouth, while the Gloucester Point gage is located near the mouth of the York River. Historical accounts of tidal flooding are available for nearly 300 years, but a reasonably accurate indication of the heights reached in Norfolk Harbor is available only since 1908, and a complete record since 1928. The Gloucester Point gage was established in 1950.

The adopted tide frequency curve for the York, Pamunkey, and Mattaponi Rivers and their estuaries in the Town of West Point is based on data from the Norfolk Harbor gage. Tidal frequencies for the Norfolk Harbor were developed by conducting a statistical analysis in accordance with procedures outlined in USGS Bulletin 17B (Reference 8). A Pearson Type III methodology was incorporated for the selected period of record, 1928 through 1978. Consideration was given to separating hurricane and nonhurricane events. Although objective statistical approaches are available for incomplete samples (a hurricane-related tide exists for fewer than 50 percent of the years on record), they do not always provide reasonable results. Therefore, all tropical and extratropical events were included together in the analysis of the annual maximum tides.

The analysis of the 51 years of systematic record indicated that the 1933 and 1936 events could be high outliers. However, assuming that the true distribution is defined by the computed (nonadjusted) statistics, the value for the 1933 event has an exceedence probability of 0.010. It has been determined that, with 51 years of record, the probability of an event this rare being exceeded is 40 percent. Since this risk is so high and it is known that several events as large if not larger than the 1933 event have historically occurred, the 1933 event (and any smaller events) was not considered to be a high outlier.

Historical accounts indicate that tides have occurred in Norfolk Harbor at approximately 8 feet in 1667 and 1785 and approximately 7.9 feet in 1846. There has been a gradual rise in sea level over the investigated period of record at Norfolk Harbor. There was some question as to the amount of adjustment that should be made to the historic events. To avoid overestimating the impact of sea level rise, the historic events were increased by only 0.50 foot (approximately the same adjustment for the 1924 to 1942 period). The analysis based on a historical period of 312 years resulted in a slight move to the left of the upper portion of the frequency curve when compared to the systematic record. Since the adjustment was not very large and there is some question as to the reliability of the historical data, the computed statistics have been adopted based on the 51 years of systematic record.

The lower portion of the statistical curve was adjusted with a partial duration analysis using plotting positions in accordance with Weibul (Reference 8). This included all elevations above 4.26 feet.

The stillwater elevations for the 10-, 50-, 100-, 500-year floods have been determined for those portions of the York, Pamunkey, and Mattaponi Rivers and their adjoining estuaries within the Town of West Point and are summarized in Table 1, "Summary of Stillwater Elevations." The tidal frequency relationship represents the combined effect of both northeasters and hurricanes on tidal flooding and reflects the random probability of surges occurring coincident with the normal astronomical tide.

TABLE 1 - SUMMARY OF STILLWATER ELEVATIONS

FLOODING SOURCE AND LOCATION	ELEVATION (feet) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
YORK RIVER AND ESTUARIES				
Entire shoreline within community	6.0	7.4	8.0	9.4
PAMUNKEY RIVER AND ESTUARIES				
Entire shoreline within community	6.0	7.4	8.0	9.4

TABLE 1 - SUMMARY OF STILLWATER ELEVATIONS - continued

FLOODING SOURCE AND LOCATION	ELEVATION (feet) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
MATTAPONI RIVER AND ESTUARIES				
Entire shoreline within community	6.0	7.4	8.0	9.4

3.2 Hydraulic Analyses

Hydraulic analyses, considering storm characteristics and the shoreline and bathymetric characteristics of the flooding sources studied, were carried out to provide estimates of the elevations of floods of the selected recurrence intervals along each of the shorelines.

Special consideration was given to the vulnerability of the Town of West Point to wave attack along the shorelines of the York, Pamunkey, and Mattaponi Rivers during severe hurricanes and northeasters. Areas of coastline subject to significant wave attack are referred to as coastal high hazard zones. The COE has established the 3-foot breaking wave as the criterion for identifying the limit of coastal high-hazard zones (Reference 9). The 3-foot wave has been determined as the minimum size wave capable of causing major damage to conventional wood frame or brick veneer structures.

Based on the criteria above, the coastline of the Town of West Point is not exposed to severe wave attack and has not been designated as part of a coastal high hazard zone.

All elevations are referenced to the National Geodetic Vertical Datum of 1929 (NGVD). Elevation reference marks used in this study are shown on the Flood Insurance Rate Maps (Exhibit 1); the descriptions of the marks are presented in Elevation Reference Marks (Exhibit 2).

4.0 FLOODPLAIN MANAGEMENT APPLICATIONS

The NFIP encourages State and local governments to adopt sound floodplain management programs. Therefore, each Flood Insurance Study provides 100-year flood elevations and delineations of the 100- and 500-year floodplain boundaries and 100-year floodway to assist in developing floodplain management measures.

4.1 Floodplain Boundaries

To provide a national standard without regional discrimination, the 1 percent annual chance (100-year) flood has been adopted by FEMA as the base flood for floodplain management purposes. The 0.2 percent

annual chance (500-year) flood is employed to indicate additional areas of flood risk in the community. For the flooding sources studied in detail, the 100- and 500-year floodplain boundaries have been delineated using topographic maps at a scale of 1:100 with a contour interval of 2 feet (Reference 10).

The 100- and 500-year floodplain boundaries are shown on the Flood Insurance Rate Map (Exhibit 1). On this map, the 100-year floodplain boundary corresponds to the boundary of the areas of special flood hazards (Zone AE), and the 500-year floodplain boundary corresponds to the boundary of areas of moderate flood hazards. In cases where the 100- and 500-year floodplain boundaries are close together, only the 100-year floodplain boundary has been shown. Small areas within the floodplain boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data.

5.0 INSURANCE APPLICATIONS

For flood insurance rating purposes, flood insurance zone designations are assigned to a community based on the results of the engineering analyses. The zones are as follows:

Zone A

Zone A is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance Study by approximate methods. Because detailed hydraulic analyses are not performed for such areas, no base flood elevations or depths are shown within this zone.

Zone AE

Zone AE is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance Study by detailed methods. In most instances, whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone AH

Zone AH is the flood insurance rate zone that corresponds to the areas of 100-year shallow flooding (usually areas of ponding) where average depths are between 1 and 3 feet. Whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone AO

Zone AO is the flood insurance rate zone that corresponds to the areas of 100-year shallow flooding (usually sheet flow on sloping terrain) where average depths are between 1 and 3 feet. Average whole-depths derived from the detailed hydraulic analyses are shown within this zone.

Zone A99

Zone A99 is the flood insurance rate zone that corresponds to areas of the 100-year floodplain that will be protected by a Federal flood protection system where construction has reached specified statutory milestones. No base flood elevations or depths are shown within this zone.

Zone V

Zone V is the flood insurance rate zone that corresponds to the 100-year coastal floodplains that have additional hazards associated with storm waves. Because approximate hydraulic analyses are performed for such areas, no base flood elevations are shown within this zone.

Zone VE

Zone VE is the flood insurance rate zone that corresponds to the 100-year coastal floodplains that have additional hazards associated with storm waves. Whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone X

Zone X is the flood insurance rate zone that corresponds to areas outside the 500-year floodplain, areas within the 500-year floodplain, and to areas of 100-year flooding where average depths are less than 1 foot, areas of 100-year flooding where the contributing drainage area is less than 1 square mile, and areas protected from the 100-year flood by levees. No base flood elevations or depths are shown within this zone.

Zone D

Zone D is the flood insurance rate zone that corresponds to unstudied areas where flood hazards are undetermined, but possible.

6.0 FLOOD INSURANCE RATE MAP

The Flood Insurance Rate Map is designed for flood insurance and floodplain management applications.

For flood insurance applications, the map designates flood insurance rate zones as described in Section 5.0 and, in the 100-year floodplains that were studied by detailed methods, shows selected whole-foot base flood elevations or average depths. Insurance agents use the zones and base flood elevations in conjunction with information on structures and their contents to assign premium rates for flood insurance policies.

For floodplain management applications, the map shows by tints, screens, and symbols, the 100- and 500-year floodplains. Floodways and the locations of selected cross sections used in the hydraulic analyses and floodway computations are shown where applicable.

7.0 OTHER STUDIES

Flood Insurance Studies are currently being prepared for the unincorporated areas of King William, New Kent, and King and Queen Counties (References 11, 12, and 13). The results of those studies will be in exact agreement with the results of this study.

8.0 LOCATION OF DATA

Information concerning the pertinent data used in preparation of this study can be obtained by contacting FEMA, the Natural and Technological Hazards Division, Liberty Square Building (Second Floor), 105 South Seventh Street, Philadelphia, Pennsylvania 19106.

9.0 BIBLIOGRAPHY AND REFERENCES

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10. The Sirine Group, LTD., of Gloucester, Virginia, Topographic Maps compiled from aerial photography, Scale 1:100, Contour Interval 2 Feet: Town of West Point, Virginia, flown on October 26, 1985.

11. Federal Emergency Management Agency, Flood Insurance Study, Unincorporated Areas of King William County, Virginia (Unpublished).

12. Federal Emergency Management Agency, Flood Insurance Study, Unincorporated Areas of New Kent County, Virginia (Unpublished).

13. Federal Emergency Management Agency, Flood Insurance Study, Unincorporated Areas of King and Queen County, Virginia (Unpublished).

EXHIBIT 2 - ELEVATION REFERENCE MARKS

Reference Mark	FIRM Panel	Elevation (Feet NGVD)	Description of Location
RM 1	02	13.993	NGS disk, stamped NO 8 1936, set in top of north end of 6th granite step from sidewalk at main (east) entrance to post office building in West Point.
RM 2	02	2.776	NGS disk, stamped C 456 1971, set on top of copper-coated rod approximately 2 inches below ground and protected by 6-inch iron pipe approximately 1 inch below ground; located at Exxon Dock and Bulk plant, approximately 163 feet north of centerline of 7th Street, and approximately 45.5 feet northwest of southwest corner of metal warehouse.
RM 3	02	11.470	NGS disk, stamped NO 7 1936, set vertically in south face of limestone foundation of Citizen and Farmers Bank located at northeast corner of intersection of Main and 8th Streets; disk is approximately 1.1 feet above level of sidewalk.
RM 4	02	8.914	NGS disk, stamped B 456 1971, set in top of southwest corner of 10 X 10-foot well located along 7th Street, approximately 0.15 mile east of intersection of 7th and Main Streets; disk is approximately 27 feet south of centerline of 7th Street.
RM 5	02	13.645	NGS disk, stamped NO 6 1936, set on top of east corner of northeast concrete footing for city water tower located midway between 6th and 7th Streets, approximately 142.5 feet north of centerline of 6th Street, and approximately 11.5 feet west of centerline of alley.